

08/414,415
APS (USPAT)
11-5-96

L1 121 S 526/147/CCLST
L2 12 S L1 AND METHYL ACRYLATE
L3 0 S L2 AND "CU(I)BR"
L4 0 S L2 AND "CU(I) "
L5 1 S L2 AND BIPYRIDINE
L6 1 S L1 AND BIPYRIDINE
L7 72 S DIBROMOXYLENE
L8 0 S L2 AND L7
L9 0 S L1 AND L7
L10 0 S L5 AND L7
L11 0 S L6 AND L7

=> d 15

1. 4,716,205, Dec. 29, 1987, Nickel-catalyzed polymerization of ethylene; Ulrich Klabunde, 526/115, 117, 118, 119, 121, 124.1, 124.2, 126, 127, 128, 135, 141, 142, 144, **147**, 149, 154, 155, 160, 161, 171, 352 [IMAGE AVAILABLE]

08/414,415
STN/CAS (CA)
11-6-96

=> s atom transfer radical polymerization

207788 ATOM
416982 TRANSFER
152211 RADICAL
163919 POLYMERIZATION

L1 12 ATOM TRANSFER RADICAL POLYMERIZATION
(ATOM(W) TRANSFER(W) RADICAL(W) POLYMERIZATION)

=> s group transfer radical polymerization

741444 GROUP
416982 TRANSFER
152211 RADICAL
163919 POLYMERIZATION

L2 0 GROUP TRANSFER RADICAL POLYMERIZATION
(GROUP(W) TRANSFER(W) RADICAL(W) POLYMERIZATION)

=> s l1 and methyl acrylate

414756 METHYL
95290 ACRYLATE
8628 METHYL ACRYLATE
(METHYL(W) ACRYLATE)

L3 4 L1 AND METHYL ACRYLATE

=> s l3 and "Cu(I)"

432409 "CU"
2559473 "I"
6463 "CU(I)"
("CU"(W) "I")

L4 1 L3 AND "CU(I)"

=> d l4 bib abs

L4 ANSWER 1 OF 1 CA COPYRIGHT 1996 ACS

AN 123:257535 CA

TI Controlled/"Living" Radical Polymerization. Halogen Atom
Transfer Radical Polymerization Promoted
by a Cu(I)/Cu(II) Redox Process

AU Wang, Jin-Shan; Matyjaszewski, Krzysztof

CS Department of Chemistry, Carnegie-Mellon University, Pittsburgh, PA,
15213, USA

SO Macromolecules (1995), 28(23), 7901-10
CODEN: MAMOBX; ISSN: 0024-9297

DT Journal

LA English

OS CJACS

AB An extension of atom transfer radical addn., ATRA, to atom transfer radical polymn., ATRP, provided a new and efficient way to conduct controlled/. By using a simple alkyl halide, R-X (X = Cl and Br), as an initiator and a transition metal species complexed by suitable ligand(s), Mtn/Lx, e.g., CuX/2,2'-bipyridine, as a catalyst, ATRP of vinyl monomers such as styrenes and (meth)acrylates proceeded in a living fashion, yielding polymers with d.p. predetd. by .DELTA.[M]/[I]0 up to Mn .apprxeq. 105 and low polydispersities, 1.1 < Mw/Mn < 1.5. The participation of free radical intermediates was supported by anal. of the end groups and the stereochem. of the polymn. The general principle and the mechanism of ATRP are elucidated. Various factors affecting the ATRP process are discussed.

=> d his

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L1 12 S ATOM TRANSFER RADICAL POLYMERIZATION
L2 0 S GROUP TRANSFER RADICAL POLYMERIZATION
L3 4 S L1 AND METHYL ACRYLATE
L4 1 S L3 AND "CU(I)"

=> d l3 bib abs 1-4

L3 ANSWER 1 OF 4 CA COPYRIGHT 1996 ACS
AN 125:248559 CA
TI Kinetic studies of atom transfer radical
polymerization of methyl acrylate
AU Paik, Hyun-jong; Matyjaszewski, Krzysztof
CS Department of Chemistry, Carnegie Mellon University, Pittsburgh, PA,
15213, USA
SO Polym. Prepr. (Am. Chem. Soc., Div. Polym. Chem.) (1996), 37(2),
274-275
CODEN: ACPPAY; ISSN: 0032-3934
DT Journal
LA English
AB Kinetic studies of the polymn. of Me acrylate with a homogeneous and
heterogeneous catalytic system are described and related to the
evolution of mol. wts. and polydispersities with conversion.

L3 ANSWER 2 OF 4 CA COPYRIGHT 1996 ACS
AN 123:257535 CA

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 AU Wang, Jin-Shan; Matyjaszewski, Krzysztof
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 CODEN: MAMOBX; ISSN: 0024-9297
 DT Journal
 LA English
 OS CJACS
 AB An extension of atom transfer radical addn., ATRA, to atom transfer
 radical polymn., ATRP, provided a new and efficient way to conduct
 controlled/. By using a simple alkyl halide, R-X (X = Cl and Br),
 as an initiator and a transition metal species complexed by suitable
 ligand(s), M_{tn}/L_x, e.g., CuX/2,2'-bipyridine, as a catalyst, ATRP of
 vinyl monomers such as styrenes and (meth)acrylates proceeded in a
 living fashion, yielding polymers with d.p. predetd. by
 .DELTA.[M]/[I]₀ up to Mn .apprxeq. 10⁵ and low polydispersities, 1.1
 < Mw/Mn < 1.5. The participation of free radical intermediates was
 supported by anal. of the end groups and the stereochem. of the
 polymn. The general principle and the mechanism of ATRP are
 elucidated. Various factors affecting the ATRP process are
 discussed.

L3 ANSWER 3 OF 4 CA COPYRIGHT 1996 ACS
 AN 123:229035 CA
 TI "Living"/Controlled Radical Polymerization. Transition-Metal-
 Catalyzed Atom Transfer Radical
 Polymerization in the Presence of a Conventional Radical
 Initiator
 AU Wang, Jin-Shan; Matyjaszewski, Krzysztof
 CS Department of Chemistry, Carnegie-Mellon University, Pittsburgh, PA,
 15213, USA
 SO Macromolecules (1995), 28(22), 7572-3
 CODEN: MAMOBX; ISSN: 0024-9297
 DT Journal
 LA English
 OS CJACS
 AB A novel type of atom transfer radical polymn., ATRP, initiated with
 AIBN/cuIICl₂/bpy affords the bulk polymn. of styrene at 130.degree.
 in a "living"/controlled manner, similar to the one with R-X/CuI/bpy
 reported earlier. Moreover, a "living"/controlled ATRP of Me
 acrylate at 130.degree. was accomplished, when a catalytic amt. of
 AIBN (1% molar equiv.) was combined with 2-chloropropionitrile

(initiator) in the presence of bpy/CuIICl₂.

L3 ANSWER 4 OF 4 CA COPYRIGHT 1996 ACS
AN 122:315212 CA
TI Controlled/"living" radical polymerization. atom
transfer radical polymerization in the
presence of transition-metal complexes
AU Wang, Jin-Shan; Matyjaszewski, Krzysztof
CS Department of Chemistry, Carnegie-Mellon University, Pittsburgh, PA,
15213, USA
SO J. Am. Chem. Soc. (1995), 117(20), 5614-15
CODEN: JACSAT; ISSN: 0002-7863
DT Journal
LA English
OS CJACS-IMAGE; CJACS
AB Atom transfer radical polymn. of styrene and Me acrylate is
investigated using 1-phenylethyl chloride as a chlorine atom
transfer precursor (initiator) and CuCl/2,2'-bipyridine complex as a
chlorine atom transfer promoter (catalyst). The "living" radical
polymn. of styrene alone generates polymers with predetd. mol. wt.
up to Mn .apprxeq. 105 and with narrow mol. wt. distribution. Block
copolymers of styrene and Me acrylate are also synthesized using the
same technique.

=> d 11 bib abs 1-12

L1 ANSWER 1 OF 12 CA COPYRIGHT 1996 ACS
AN 125:248559 CA
TI Kinetic studies of atom transfer radical
polymerization of methyl acrylate
AU Paik, Hyun-jong; Matyjaszewski, Krzysztof
CS Department of Chemistry, Carnegie Mellon University, Pittsburgh, PA,
15213, USA
SO Polym. Prepr. (Am. Chem. Soc., Div. Polym. Chem.) (1996), 37(2),
274-275
CODEN: ACPPAY; ISSN: 0032-3934
DT Journal
LA English
AB Kinetic studies of the polymn. of Me acrylate with a homogeneous and
heterogeneous catalytic system are described and related to the
evolution of mol. wts. and polydispersities with conversion.

L1 ANSWER 2 OF 12 CA COPYRIGHT 1996 ACS
AN 125:222588 CA
TI Branched and hyperbranched macromolecules by atom

transfer radical polymerization

AU Gaynor, Scott G.; Edelman, Shane Z.; Kulfan, Anthony; Matyjaszewski, Krzysztof
CS Department of Chemistry, Carnegie Mellon University, Pittsburgh, PA, 15213, USA
SO Polym. Prepr. (Am. Chem. Soc., Div. Polym. Chem.) (1996), 37(2), 413-414
CODEN: ACPPAY; ISSN: 0032-3934
DT Journal
LA English
AB Homopolymn. of p-chlorostyrene (I) in the presence of CuCl and 2,2'-bipyridyl gave hyperbranched polystyrene, which could copolymd. with Bu acrylate to grow linear chains off the hyperbranched macromol. The prepn. of branched polymers was demonstrated by copolymn. of I with styrene and with Me methacrylate.

L1 ANSWER 3 OF 12 CA COPYRIGHT 1996 ACS

AN 125:222540 CA

TI Kinetic investigation of the atom transfer
radical polymerization of styrene in homogeneous
systems

AU Xia, Jianhui; Matyjaszewski, Krzysztof
CS Department of Chemistry, Carnegie Mellon University, Pittsburgh, PA, 15213, USA
SO Polym. Prepr. (Am. Chem. Soc., Div. Polym. Chem.) (1996), 37(2), 513-514
CODEN: ACPPAY; ISSN: 0032-3934
DT Journal
LA English
AB The kinetics of atom transfer radical polymn. of styrene under homogeneous conditions was investigated.

L1 ANSWER 4 OF 12 CA COPYRIGHT 1996 ACS

AN 125:222482 CA

TI Principle and feature of atom transfer
radical polymerization

AU Luo, Ning; Ying, Shengkang
CS Inst. of Material Sci. and Eng., East China Univ. of Sci. and Technol., Shanghai, 200237, Peop. Rep. China
SO Hecheng Xiangjiao Gongye (1996), 19(5), 299-302
CODEN: HXGOEA; ISSN: 1000-1255
DT Journal; General Review
LA Chinese
AB A review with 12 refs. on principle, classification, feature, and application of atom transfer radical polymn.

L1 ANSWER 5 OF 12 CA COPYRIGHT 1996 ACS

AN 124:344280 CA

TI Polymers with very low polydispersities from atom transfer radical polymerization

AU Patten, Timothy E.; Xia, Jianhui; Abernathy, Teresa; Matyjaszewski, Krzysztof

CS Dep. Chem., Carnegie Mellon Univ., Pittsburgh, PA, 15213, USA

SO Science (Washington, D. C.) (1996), 272(5263), 866-868

CODEN: SCIEAS; ISSN: 0036-8075

DT Journal

LA English

AB A radical polymn. process that yields well-defined polymers normally obtained only through anionic polymn. is reported. Atom transfer radical polymn. of styrene was conducted with several solubilizing ligands for the copper(I) halides: 4,4'-di-tert-Bu-, 4,4'-di-n-heptyl-, and 4,4'-di-(5-nonyl)-2,2'-dipyridyl. The resulting polymns. have all of the characteristics of a living polymn. and displayed linear semilogarithmic kinetic plots, a linear correlation between the no.-av. mol. wt. and the monomer conversion, and low polydispersity (ratio of the wt.-av. to no.-av. mol. wts. of 1.04 to 1.05). Similar results were obtained for the polymn. of acrylates.

L1 ANSWER 6 OF 12 CA COPYRIGHT 1996 ACS

AN 124:318011 CA

TI Radical polymerization yielding polymers with Mw/Mn .apprx.1.05 by homogeneous atom transfer radical polymerization

AU Patten, Timothy E.; Xia, Jianhui; Abernathy, Teresa; Matyjaszewski, Krzysztof

CS Department Chemistry, Carnegie Mellon University, Pittsburgh, PA, 15213, USA

SO Polym. Prepr. (Am. Chem. Soc., Div. Polym. Chem.) (1996), 37(1), 575-6

CODEN: ACPPAY; ISSN: 0032-3934

DT Journal

LA English

AB Radical polymn. processes can yield well-defined polymers that heretofore could only be obtained through anionic polymns. The ATRP [atom transfer radical polymn.] technique involves [2,2'-bipyridyl] ligands that solubilize copper halides in the polymn. medium, and yields polymers with polydispersity of 1.05 or less, while maintaining the living nature of the polymn. In a typical ATRP of styrene, either 1-phenylethyl chloride or bromide is used as

initiator, and a mixt. of CuCl or CuBr and 2,2'-bipyridyl is the catalyst. The soly. of the Cu halide was enhanced when 4,4'-alkyl substituted bipyridyls were used. Thus with ATRP, radical polymn. can be used in the design and prepn. of well-defined materials and structurally complex macromols.

L1 ANSWER 7 OF 12 CA COPYRIGHT 1996 ACS

AN 124:317996 CA

TI From hyperbranched to crosslinked polymers by atom transfer radical polymerization

AU Gaynor, Scott G.; Edelman, Shane Z.; Matyjaszewski, Krzysztof

CS Mellon Institute, Carnegie Mellon University, Pittsburgh, PA, 15213, USA

SO Polym. Mater. Sci. Eng. (1996), 74, 236-7

CODEN: PMSEDG; ISSN: 0743-0515

DT Journal

LA English

AB Branched and hyperbranched polymers were prepd. by atom transfer radical polymn. The hyperbranched polymer was prepd. by homopolymn. of an AB₂-type monomer (with 2 functional groups), such as p-chloromethylstyrene (I) in the presence of Cu(I) initiator. The branched polymer was prepd. by copolymn. of I with styrene under the same conditions. Formation of crosslinked gels occurred when either of the polymns. was carried out for long periods of time. The living nature of the polymn. is discussed, and some characteristics of the polymers are given.

L1 ANSWER 8 OF 12 CA COPYRIGHT 1996 ACS

AN 124:87826 CA

TI Atom transfer radical polymerization (ATRP): A new approach towards well-defined (co)polymers

AU Wang, Jin-Shan; Greszta, Dorota; Matyjaszewski, Krzysztof

CS Department Chemistry, Carnegie Mellon University, Pittsburgh, PA, 15213, USA

SO Polym. Mater. Sci. Eng. (1995), 73, 416-17

CODEN: PMSEDG; ISSN: 0743-0515

DT Journal; General Review

LA English

AB A review with 8 refs. on the use of ATRP to produce well-defined polymers.

L1 ANSWER 9 OF 12 CA COPYRIGHT 1996 ACS

AN 124:87825 CA

TI Transition metal catalyzed atom transfer

radical polymerization (ATRP): Principle and mechanism

AU Wang, Jin-Shan; Matyjaszewski, Krzysztof
CS Mellon Institute, Carnegie Mellon University, Pittsburgh, PA, 15213, USA
SO Polym. Mater. Sci. Eng. (1995), 73, 414-15
CODEN: PMSEDG; ISSN: 0743-0515
DT Journal; General Review
LA English
AB A review with 11 refs. on the principles and mechanism of ATRP.

L1 ANSWER 10 OF 12 CA COPYRIGHT 1996 ACS

AN 123:257535 CA

TI Controlled/"Living" Radical Polymerization. Halogen Atom Transfer Radical Polymerization Promoted by a Cu(I)/Cu(II) Redox Process

AU Wang, Jin-Shan; Matyjaszewski, Krzysztof
CS Department of Chemistry, Carnegie-Mellon University, Pittsburgh, PA, 15213, USA

SO Macromolecules (1995), 28(23), 7901-10
CODEN: MAMOBX; ISSN: 0024-9297

DT Journal

LA English

OS CJACS

AB An extension of atom transfer radical addn., ATRA, to atom transfer radical polymn., ATRP, provided a new and efficient way to conduct controlled/. By using a simple alkyl halide, R-X (X = Cl and Br), as an initiator and a transition metal species complexed by suitable ligand(s), Mtn/Lx, e.g., CuX/2,2'-bipyridine, as a catalyst, ATRP of vinyl monomers such as styrenes and (meth)acrylates proceeded in a living fashion, yielding polymers with d.p. predetd. by $\Delta[M]/[I]_0$ up to Mn .apprxeq. 105 and low polydispersities, $1.1 < Mw/Mn < 1.5$. The participation of free radical intermediates was supported by anal. of the end groups and the stereochem. of the polymn. The general principle and the mechanism of ATRP are elucidated. Various factors affecting the ATRP process are discussed.

L1 ANSWER 11 OF 12 CA COPYRIGHT 1996 ACS

AN 123:229035 CA

TI "Living"/Controlled Radical Polymerization. Transition-Metal-Catalyzed Atom Transfer Radical Polymerization in the Presence of a Conventional Radical Initiator

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15213, USA

SO Macromolecules (1995), 28(22), 7572-3

CODEN: MAMOBX; ISSN: 0024-9297

DT Journal

LA English

OS CJACS

AB A novel type of atom transfer radical polymn., ATRP, initiated with AIBN/cuIICl₂/bpy affords the bulk polymn. of styrene at 130.degree. in a "living"/controlled manner, similar to the one with R-X/CuI/bpy reported earlier. Moreover, a "living"/controlled ATRP of Me acrylate at 130.degree. was accomplished, when a catalytic amt. of AIBN (1% molar equiv.) was combined with 2-chloropropionitrile (initiator) in the presence of bpy/CuIICl₂.

L1 ANSWER 12 OF 12 CA COPYRIGHT 1996 ACS

AN 122:315212 CA

TI Controlled/"living" radical polymerization. atom

transfer radical polymerization in the
presence of transition-metal complexes

AU Wang, Jin-Shan; Matyjaszewski, Krzysztof

CS Department of Chemistry, Carnegie-Mellon University, Pittsburgh, PA,
15213, USA

SO J. Am. Chem. Soc. (1995), 117(20), 5614-15

CODEN: JACSAT; ISSN: 0002-7863

DT Journal

LA English

OS CJACS-IMAGE; CJACS

AB Atom transfer radical polymn. of styrene and Me acrylate is investigated using 1-phenylethyl chloride as a chlorine atom transfer precursor (initiator) and CuCl/2,2'-bipyridine complex as a chlorine atom transfer promoter (catalyst). The "living" radical polymn. of styrene alone generates polymers with predetd. mol. wt. up to Mn .apprxeq. 105 and with narrow mol. wt. distribution. Block copolymers of styrene and Me acrylate are also synthesized using the same technique.